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DETAILED ACTION

1. Claims 1-62 are presented for examination.

Claim Rejections - 35 USC § 101

2. Independent claims 1 and 20-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The language of the claims raises a question as to whether the claims are directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful and tangible result. The multimedia streaming server (A server is the computer program that serves requested HTML pages or files by the client) and multimedia streaming client (a software program that is used to contact and obtain data from a Server software program) are computer programs (software per se) performing various functionalities. These functionalities do not manipulate any hardware or tangible entity. Therefore, these software constructs are non statutory entities as detailed in MPEP 2106.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-62, are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et. Al. (2002/0010938) (hereinafter Zhang) in view of Lennon et. Al.

(2002/0152267) (hereinafter Lennon).

5. As per claim 1, Zhang discloses a multimedia streaming apparatus comprising:

a multimedia streaming server (210, fig 2) which streams multimedia data corresponding to a predetermined quality of service (QoS) level (214, fig2, page 3, paragraph #0044) in response to a parsing result of metadata (meta data is interpreted as information about information, i.e. MSFTP-TCP friendly header, para #0049) corresponding to multimedia data intended to be provided for service (216, fig 2, para #0044, **"A Quality of Service (QoS) Adaptation and Global Resource Allocation Control module 214 adjusts the quality of the bit stream that is transmitted from server 210 to client 230 through Internet 220. Module 214 periodically estimates the available bandwidth from the MSTFP protocol as derived from module 212. Combining this information with the media characteristics of media streams Video.sub.m, Video.sub.n, and Audio.sub.k, module 214 adjusts the quality of the total transmitted streams by resource re-allocation in a Global Buffer Control module 216 at Server 210. Data occupying the global buffer is transmitted from Server 210 in the MSFTP protocol at module 212 through Internet"**) and network

bandwidth information which is input from a client (page 3, paragraph #0042 -#0044);
and

a multimedia streaming client (230, fig 2) which measures the bandwidth of a network to which the server is connected (232, fig 2; page 4, paragraph #0046; page 7, paragraph #0106-#0112) by using a time interval when multimedia data is received and information on the size of the multimedia data (elements of fig 2, page 4, paragraph #0046; page 7, paragraph #0106-#0126), and transmits the measured bandwidth information to the server (elements of fig 2, page 4, paragraph #0046; page 7, paragraph #0106-#0126).

Zhang explicitly does not teach wherein the metadata has multimedia data and streaming-related information. However, Lennon discloses wherein the metadata has multimedia data and streaming-related information (page 4, paragraph #0060). Zhang discloses an implementation of an end-end framework for media streaming over the Internet using Multimedia TCP-friendly protocol. Lennon facilitates access to multimedia content using metadata stored in the XML documents. Zhang explicitly does not teach use of XML, that allows information and services to be encoded with meaningful structure and semantics that computers and humans can understand. XML is great for information exchange, and can easily be extended to include user-specified and industry-specified tags and metadata. It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by Zhang to incorporate the metadata and XML teachings of Lennon for efficiently using bandwidth.

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6. As per claims 24 and 46, Zhang disclose a multimedia streaming server and method to be performed between a server and client that connected through network (210, fig 2), comprising: a data storage unit which stores multimedia data desired to be provided for service and metadata (meta data is interpreted as information about information, i.e. MSFTP-TCP friendly header, para #0049) related to the multimedia data (210,214 fig 2, pages 3-4, paragraph #0044-#0045);

a message receiving unit which receives network bandwidth information from a client connected to a network 214, fig 2, pages 3-4, paragraph #0044-#0045);

a quality of service (QoS) processing unit which selects a QoS level available for service in response to the descriptor information and the network bandwidth information (214, fig 2, pages 3-4, paragraph #0044-#0045), and extracts multimedia data corresponding to the selected QoS level, from the data storage unit (214, fig 2, pages 3-4, paragraph #0044-#0045);

a buffer which stores the extracted data 216, fig 2, pages 3-4, paragraph #0044-#0045);

a packet generation unit which packetizes the data stored in the buffer (210, fig 2, pages 3-4, paragraph #0044-#0045); and

a packet transmission unit which transmits the packet data to the client in each predetermined time interval (212, fig 2, pages 3-4, paragraph #0044-#0045),

wherein the metadata has a multimedia data and streaming –related information.

Zhang fails to disclose a metadata parsing unit which parses the metadata and outputs the parsing result in the form of a descriptor. However, Lennon discloses a metadata

parsing unit which parses the metadata and outputs the parsing result in the form of a descriptor (pages 5-6, paragraph #0070-#0079). Zhang discloses an implementation of an end-end framework for media streaming over the Internet using Multimedia TCP-friendly protocol. Lennon facilitates access to multimedia content using metadata stored in the XML documents. Zhang explicitly does not teach use of XML, that allows information and services to be encoded with meaningful structure and semantics that computers and humans can understand. XML is great for information exchange, and can easily be extended to include user-specified and industry-specified tags and metadata. It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by Zhang to incorporate the metadata and XML teachings of Lennon for efficiently using bandwidth.

7. As per claim 42, Zhang discloses a multimedia streaming client comprising:

a packet receiving unit which receives the multimedia data from a server connected to a network (232, fig 2, pages 3-4, paragraph #0044-#0046);

a buffer which stores the received multimedia data; a multimedia decoder which reproduces the data stored in the buffer (230, fig 2 and fig 9, pages 3-4, paragraph #0044-#0046); a bandwidth measuring unit which measures a network bandwidth by using the time interval when the multimedia data is received in the packet receiving unit and the size information of the data (230, fig 2 and fig 9, pages 3-4, paragraph #0044-#0061).

Zhang explicitly does not disclose a message transmission unit which transmits the measured network bandwidth to the server so that the transmission rate of the multimedia data transmitted from the server is adjusted to the network bandwidth. However Lennon discloses a message transmission unit which transmits the measured network bandwidth to the server so that the transmission rate of the multimedia data transmitted from the server is adjusted to the network bandwidth (modification bandwidth #0239). Zhang discloses in paragraph [0076] dynamic resource allocation for distributed multimedia systems that support application-level control. In the example illustrated in FIG. 2, dynamic network bandwidth estimations are made using the changing characteristics of Internet using the MSFTP protocol. It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by ZHANG to incorporate the media browser server of Lennon for customizing the streaming of the content to the device by modifying bandwidth.

8. As per claim 53, the claim is rejected for the same reasons as claim 24, above. In addition, Zhang discloses (a) receiving an estimated bandwidth of the network from the client; (b) based on a descriptor obtained as a result of parsing metadata corresponding to multimedia data desired to be provided for service, selecting a current time segment (fig 9, pages 7-8, please see discussion Network Adaptive Rate Control Scheme), paragraph #0107-); (c) comparing a target bit rate defined in the descriptor for the

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selected segment with the estimated network bandwidth (fig 9, pages 7-8, please see discussion Network Adaptive Rate Control Scheme).

9. As per claim 2, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the multimedia streaming server comprises: a data storage unit which stores multimedia data desired to be provided for service and metadata related to the multimedia data (216, fig 2, page 3, paragraph #0044);

a metadata parsing unit which parses the metadata and outputs the parsing result in the form of a descriptor (214, fig 2, page 3, paragraph #0044);

a message receiving unit which receives the network bandwidth information from a client (212, fig 2, page 3, paragraph #0044);

a quality of service (QoS) processing unit which selects a QoS level available for service in response to the descriptor information and the network bandwidth information (214, fig 2, page 3, paragraph #0044), and extracts multimedia data corresponding to the selected QoS level (214, fig 2, page 3, paragraph #0044), from the data storage unit (216, 214 fig 2, page 3, paragraph #0044);

a buffer which stores the extracted data (pages 3-4, paragraph #0044-#0045);

a packet generation unit which packetizes the data stored in the buffer (pages 3-4, paragraph #0044-#0045); and

a packet transmission unit which transmits the data stored in the buffer to the client in each predetermined time interval (pages 3-4, paragraph #0044-#0045).

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10. As per claim 3, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the QoS processing unit comprises: a service level selection unit which compares a target bit rate for each QoS level (214, fig 2) with the bandwidth and selects a predetermined QoS level (214, fig 2, pages 3-4, paragraph #0044-#0061); and a frame selection unit which extracts frames corresponding to the QoS level (214, fig 2) from the multimedia data stored in the data storage unit (210, fig 2) and stores the extracted frames in the buffer (pages 3-4, paragraph #0044-#0061).

11. As per claim 4, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the buffer comprises: a packet storage buffer which stores the packet 210, fig 2); and a packet transmission buffer which transmits the packet 210, fig 2).

12. As per claim 5, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the multimedia data has any one form of audio data (210, fig 2), moving picture data, still picture data, text data, and graphic data (210, fig 2).

13. As per claim 6, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the multimedia data is formed with a bit stream which has any one of a spatial scalable function, a quality scalable function, a temporal scalable function, and fine grain scalable (FGS) function (pages 4-7, paragraph #0047-#0113).

14. As per claims 7, 29, 50, and 56, Zhang fails to disclose the metadata is defined based on an extensible markup language (XML). However, Lennon discloses the metadata is defined based on an extensible markup language (XML) (page 4, paragraph #0066). Zhang discloses an implementation of an end-end framework for media streaming over the Internet using Multimedia TCP-friendly protocol. Lennon facilitates access to multimedia content using metadata stored in the XML documents. Zhang explicitly does not teach use of XML, that allows information and services to be encoded with meaningful structure and semantics that computers and humans can understand. XML is great for information exchange, and can easily be extended to include user-specified and industry-specified tags and metadata. It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by ZHANG to incorporate the metadata and XML teachings of Lennon for efficiently using bandwidth.

15. As per claims 8, 30, 51, and 57, Zhang fails to disclose the metadata has a hierarchical structure in the form of a tree having the multimedia data and streaming-related information. However, Lennon discloses the metadata has a hierarchical structure in the form of a tree having the multimedia data and streaming-related information (pages 5-6, paragraph #0070-#0079). Zhang discloses an implementation of an end-end framework for media streaming over the Internet using Multimedia TCP-friendly protocol. Lennon facilitates access to multimedia content using metadata stored

in the XML documents. Zhang explicitly does not teach use of XML, that allows information and services to be encoded with meaningful structure and semantics that computers and humans can understand. XML is great for information exchange, and can easily be extended to include user-specified and industry-specified tags and metadata. It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by ZHANG to incorporate the metadata and XML teachings of Lennon for efficiently using bandwidth.

16. As per claims 9 and 31, claims are rejected for the same reasons as claim 8, as above. In addition, Lennon discloses the metadata comprises: a STREAMING HINT node which specifies the control type of the metadata and the type of the hierarchical structure of a node (XML document provide hint to a processor, pages 5-6, paragraph #0073-#0079); a HEADER GROUP HINT node which is connected to the STREAMING HINT node as a subordinate node of the STREAMING HINT node and contains header information of the multimedia data (XML document provide hint to a processor, pages 5-6, paragraph #0073-#0079); at least one or more SEGMENT GROUP HINT nodes, each of which is connected to the STREAMING HINT node as a subordinate node of the STREAMING HINT node and contains segment information when the multimedia is divided into segments of a predetermined time interval (XML document provide hint to a processor, pages 5-6, paragraph #0073-#0079); at least one or more FRAME HEADER HINT nodes, each of which is connected to the HEADER GROUP HINT node as a

subordinate node of the HEADER GROUP HINT node, and contains an attribute value indicating unique information of each node (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); at least one or more MEDIA SEGMENT HINT nodes, each of which is connected to the SEGMENT GROUP HINT node as a subordinate node of the SEGMENT GROUP HINT node, and contains attribute information on each Quos level (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); and at least one or more MEDIA FRAME HINT nodes, each of which is connected to the MEDIA SEGMENT HINT node as a subordinate node of the MEDIA SEGMENT HINT node and contains multimedia frame information to be actually transmitted (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079).

17. As per claims 10 and 32, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the STREAMING HINT node comprises: a target bit rate adjuster which adjusts a transmission bit rate to the change of the network bandwidth (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a target quality adjuster which adjusts QoS of multimedia data to be provided for service; a target complexity adjuster which supports differentiated services according to resource complexity of the client (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a target profile adjuster which supports differentiated services according to the compression format of the multimedia data (XML document, pages 5-6 and 7, paragraph #0073-#0079); a target speed

adjuster which adjusts a service speed according to a reproduction speed adjusting request from the client (metadata, pages 5-6 and 7, paragraph #0073-#0079); a target direction adjuster which adjusts a service direction according to a reproduction direction adjusting request from the client (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); and a target device adjuster which supports differentiated services according to the type of the client terminal (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079).

18. As per claims 11 and 33, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses a stream identifier which distinguishes each multimedia stream when a plurality of multimedia objects are provided at the same time for service (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a stream type identifier which distinguishes the type of the multimedia data (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a scalable function identifier which distinguishes the type of a scalable function for the multimedia data (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a source location identifier which indicates location information of the multimedia data stored in the data storage unit (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a frame rate identifier which indicates the frame rate of the multimedia data; and an average bit rate identifier which indicates the average bit rate of the multimedia data (XML document

provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079).

19. As per claim 12, the claim is rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the HEADER GROUP HINT node contains the same number of FRAME HEADER HINT nodes as the number of multimedia objects to be provided for service (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079).

20. As per claims 13 and 35, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the SEGMENT GROUP HINT node contains the same number of the MEDIA SEGMENT HINT nodes as the number of the QoS levels (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079, page 20, paragraph 217).

21. As per claims 14, 34, and 36, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the MEDIA SEGMENT HINT node contains the same number of MEDIA FRAME HINT nodes as the number of entire frames to be provided for service at each QoS level (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079).

22. As per claims 15 and 37, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the MEDIA FRAME HINT node comprises: a

stream identifier which distinguishes each multimedia stream when a plurality of multimedia objects are provided at the same time for service (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a decoding/reproduction time identifier which indicates decoding time information and reproduction (page 15, paragraph #017) time information of a frame (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079); a coding type identifier which distinguishes frames into I frames, P frames, and B frames according to a method a frame is referred to when the frame is encoded (XML document provide hint to a processor, pages 5-8, paragraph #0073-#0094); a frame offset identifier which indicates location information of each frame of the multimedia data stored in the data storage unit (XML document provide hint to a processor, pages 5-8, paragraph #0073-#0094) ; a frame length identifier which indicates the size of a corresponding frame (XML document provide hint to a processor, pages 5-8, paragraph #0073-#0094); and a frame number identifier which indicates the number of a corresponding frame (XML document provide hint to a processor, pages 5-8, paragraph #0073-#0094).

23. As per claims 16 and 38, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses the metadata is broken down into independent-type metadata and dependent-type metadata according to an attribute of the MEDIA SEGMENT HINT node (XML document provide hint to a processor, page 5, paragraph #0073).

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24. As per claims 17 and 39, claims are rejected for the same reasons as claim 17, as above. In addition, Lennon discloses each node of the independent-type metadata contains frame information of multimedia data corresponding to a service level without reference to an upper node or reuse (XML document provide hint to a processor, pages 5-8, paragraph #0073-#0094).

25. As per claims 18 and 40, claims are rejected for the same reasons as claim 9, as above. In addition, Lennon discloses each node of the dependent-type metadata refers to an upper node for information shared at a plurality of QoS levels and specifies only additional information in a lower node (XML document provide hint to a processor, pages 5-6 and 7, paragraph #0073-#0079, page 20, paragraph 217).

26. As per claim 19, Zhang Discloses if the number of the QoS levels increases, the frame drop rate of the multimedia streaming server gradually decreases and the average bit rate and average peak signal to noise ratio (PSNR) value gradually increase (page 9, paragraph #0131).

27. As per claim 20, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses a packet receiving unit which receives the multimedia data from the server (232, fig 2, pages 3-4, paragraph #0045-#0046);

a buffer which stores the received multimedia data; a multimedia decoder which reproduces the data stored in the buffer (230, fig 2);

a bandwidth measuring unit which measures a network bandwidth by using the time when the multimedia data is received in the packet receiving unit and the size information of the data (232, fig 2, pages 3-4, paragraph #0045-#0062); and a message transmission unit which transmits the measured network bandwidth to the server so that the transmission rate of the multimedia data transmitted from the server is adjusted to the network bandwidth (210, fig 2, pages 3-4, paragraph #0044-#0062).

28. As per claims 21 and 43, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses the packet receiving unit distinguishes the first packet and the last packet of each packet group by referring to the packet number of the received multimedia data (210, fig 2, pages 3-4, paragraph #0045-#0049).

29. As per claim 22 and 44, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses assuming that a time when the first packet is received is t_1 , a time when the last packet is received is t_2 , and the size of the packet group data is S_p , the network bandwidth is obtained by the following equation:

$$E\ BW\ (Bandwidth) = S_p \times 8 \times 1000 / t_2 - t_1 \text{ (page 6, paragraph, \#0093-#0096).}$$

30. As per claims 23 and 45, the claim is rejected for the same reasons as claim 1, above. In addition, Zhang discloses wherein the bandwidth measuring unit feeds the network bandwidth information back to the server through the message transmission

unit whenever the network bandwidth varies (page 5, paragraph, #0066-#0072).

31. As per claim 25, the claim is rejected for the same reasons as claim 24, above. In addition Zhang discloses the QoS processing unit comprises: a service level selection unit which compares a target bit rate for each QoS level with the bandwidth and selects a predetermined QoS level (214, fig 2, pages 3-4, paragraph #0044-#0045); and a frame selection unit which extracts frames corresponding to the QoS level from the multimedia data stored in the data storage unit and stores the extracted frames in the buffer 214, fig 2, pages 3-4, paragraph #0044-#0045).

32. As per claim 26, the claim is rejected for the same reasons as claim 24, above. In addition Zhang discloses the buffer comprises: a packet storage buffer which stores the packet data generated by the packet generation unit 210, fig 2, pages 3-4, paragraph #0044-#0045); and a packet transmission buffer which transmits the packet data (210, fig 2, pages 3-4, paragraph #0044-#0045).

33. As per claims 27 and 54, claims are rejected for the same reasons as claim 24, above. In addition Zhang discloses wherein the multimedia data has any one form of audio data, moving picture data, still picture data, text data, and graphic data (210, fig 2, pages 3-4, paragraph #0044-#0045).

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34. As per claims 28 and 55, claims are rejected for the same reasons as claim 24, above. In addition Zhang discloses the multimedia data is formed with a bit stream which has any one of a spatial scalable function, a quality scalable function, a temporal scalable function, and fine grain scalable (FGS) function (pages 4-7, paragraph #0047-#0113).

35. As per claims 41, 52, and 58, claims are rejected for the same reasons as claim 24, above. In addition, Zhang discloses if the number of the QoS levels increases, the frame drop rate of the multimedia streaming server gradually decreases and the average bit rate and average peak signal to noise ratio (PSNR) value gradually increase (page 9, paragraph #0131).

36. As per claim 47, the claim is rejected for the same reasons as claim 46, above. In addition, Zhang discloses wherein the step (e) comprises: (e-1) setting the size value of an accumulated packet to 0 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control);

(e-2) starting to receive a packet from the server; (e-3) setting the time when a first packet is received as T1 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control);

(e-4) after the first packet is input till a last packet is input, whenever a packet is input, accumulating the size value of the packet to the size of the accumulated packet (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control);

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(e-5) if the last packet is input, setting the time when the last packet is input as TS2 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control);

(e-6) measuring the network bandwidth by calculating:

Accumulated packet size .times. 1000 .times. 8 TS2 - TS1 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control);

(e-7) feeding the measured network bandwidth information back to the server (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control).

37. As per claim 48, the claim is rejected for the same reasons as claim 46, above. In addition. Zhang discloses the multimedia data has any one form of audio data, moving picture data, still picture data, text data, and graphic data (210,230, fig 2, page 3, paragraph #0042).

38. As per claim 49, the claim is rejected for the same reasons as claim 46, above. In addition. Zhang discloses the multimedia data is formed with a bit stream which has any one of a spatial scalable function, a quality scalable function, a temporal scalable function, and fine grain scalable (FGS) function (pages 4-7, paragraph #0047-#0113).

39. As per claim 59, the claim is rejected for the same reasons as claim 42, above. In addition Zhang discloses a network bandwidth measuring method of a client which receives multimedia data from a server through a network, the method comprising: (a) setting the size value of an accumulated packet to 0 (fig 9, pages 7-9, please see the

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discussion of Network Adaptive Rate Control); (b) starting to receive a packet from the server (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); (c) setting the time when a first packet is received as TS1 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); (d) after the first packet is input until a last packet is input, whenever a packet is input, accumulating the size value of the packet to the size of the accumulated packet (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); (e) if the last packet is input, setting the time when the last packet is input as T2 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); (f) measuring the network bandwidth by calculating (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control):

Accumulated packet size. times. 1000 .times. 8 TS2 - TS1;

(g) feeding the measured network bandwidth information back to the server (fig 9, page 8, paragraph #0128).

40. As per claims 60 and 61, claims are rejected for the same reasons as claim 46, above. In addition, Zhang discloses a computer readable storage media having (page 9, paragraph #0138).

41. As per claim 62, Zhang discloses a computer readable storage media having embodied thereon a computer program for performing the method of claim 59 (page 9, paragraph #0138).

Response to Arguments

42. Applicant's arguments filed 01/02/2009 have been fully considered but they are not persuasive, therefore rejections to claims 1-62 is maintained.

43. Applicant argues that 101 rejection is improper. However, a merely allegation is not evidence enough. In the representative claim 1, the applicant's describes in the Claim, the multimedia streaming server (A server is the computer program that serves requested HTML pages or files by the client) and multimedia streaming client (a software program that is used to contact and obtain data from a Server software program) are computer programs (software per se) performing various functionalities. These functionalities do not manipulate any hardware or tangible entity. Therefore, these software constructs are non statutory entities as detailed in MPEP 2106.

Claims rejections to 1, 20-23 is maintained under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to particular machine, or (2) transform underlying subject matter (such as an article or material) to a different state or thing. The instant claims are neither positively tied to a particular machine that accomplishes the claimed method steps nor transform underlying subject matter, and therefore do not qualify as a statutory process. The claim is broad enough that the claim could be completely performed mentally, verbally or without a machine nor is any transformation apparent. A particular machine is a

machine that is not every machine and an example of an insignificant tie would be adding a computer display to a manual process.

The tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the process claim must set forth a practical application of that judicial exception to produce a real-world result. If the broadest reasonable interpretation of the claimed invention as a whole encompasses a human being, then a rejection under 35 U.S.C. 101 must be made indicating that the claimed invention is directed to nonstatutory subject matter.

Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See *Arrhythmia*, 958 F.2d at 1057, 22 USPQ2d at 1036. Merely claiming nonfunctional descriptive material stored in a computer-readable medium does not make the invention eligible for patenting. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some "real world" value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application.

35 U.S.C. 101 defines four categories of inventions that Congress deemed to be the appropriate subject matter of a patent; namely, processes, machines, manufactures and compositions of matter. The latter three categories define "things" while the first

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category defines "actions" (i.e., inventions that consist of a series of steps or acts to be performed). See 35 U.S.C. 100(b) ("The term process' means process, art, or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.").

Federal courts have held that 35 U.S.C. 101 does have certain limits. First, the phrase "anything under the sun that is made by man" is limited by the text of 35 U.S.C. 101, meaning that one may only patent something that is a machine, manufacture, composition of matter or a process. See, e.g., *Alappat*, 33 F.3d at 1542, 31 USPQ2d at 1556; *Warmerdam*, 33 F.3d at 1358, 31 USPQ2d at 1757 (Fed. Cir. 1994). Second, 35 U.S.C. 101 requires that the subject matter sought to be patented be a "useful" invention.

Accordingly, a complete definition of the scope of 35 U.S.C. 101, reflecting Congressional intent is that any new and useful process, machine, manufacture or composition of matter under the sun that is made by man is the proper subject matter of a patent. The subject matter courts have found to be outside the four statutory categories of invention is limited to abstract ideas, laws of nature and natural phenomena. While this is easily stated, determining whether an applicant is seeking to patent an abstract idea, a law of nature or a natural phenomenon has proven to be challenging. These three exclusions recognize that subject matter that is not a practical application or use of an idea; a law of nature or a natural phenomenon is not patentable. See, e.g., *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. (20 Wall.) 498, 507 (1874) ("idea of itself is not patentable, but a new device by which it may be made practically useful is");

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Mackay Radio & Telegraph Co. v. Radio Corp. of America, 306 U.S. 86, 94, 40 USPQ 199, 202 (1939) ('while a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.');

Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759 ("steps of locating' a medial axis, and 'creating' a bubble hierarchy..., describe nothing more than the manipulation of basic mathematical constructs, the paradigmatic abstract idea' ").

Courts have expressed a concern over "preemption" of ideas, laws of nature or natural phenomena. The concern over preemption was expressed as early as 1852. See Le Roy v. Tatham, 55 U.S. 156, 175 (1852) ("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right."); Funk Brothers Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 132, 76 USPQ 280, 282 (1948) (combination of six species of bacteria held to be nonstatutory subject matter). The concern over preemption serves to bolster and justify the prohibition against the patenting of such subject matter. In fact, such concerns are only relevant to claiming a scientific truth or principle. **Thus, a claim to an "abstract idea" is nonstatutory because it does not represent a practical application of the idea, not because it would preempt the idea.**

Claims to computer-related inventions that are clearly nonstatutory fall into the same general categories as nonstatutory claims in other arts, namely natural phenomena such as magnetism, and abstract ideas or laws of nature which constitute "descriptive material."

Abstract ideas, Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759, or the mere manipulation of abstract ideas, Schrader, 22 F.3d at 292-93, 30 USPQ2d at 1457-58, are not patentable. **Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. Both types of, descriptive material" are nonstatutory when claimed as descriptive material per se. Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759.**

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory). When nonfunctional descriptive material is recorded on some computer-readable medium, it is

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not statutory since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material stored in a computer-readable medium does not make it statutory. Such a result would exalt form over substance. In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) ("Each invention must be evaluated as claimed; yet semantic considerations preclude a determination based solely on words appearing in the claims. In the final analysis under 101, the claimed invention, as a whole, must be evaluated for what it is.") (quoted with approval in Abele, 684 F.2d at 907, 214 USPQ at 687). See also In re Johnson, 589 F.2d 1070, 1077, 200 USPQ 199,206 (CCPA 1978) ("form of the claim is often an exercise in drafting"). Thus, nonstatutory music is not a computer component and it does not become Statutory by merely recording it on a compact disk. Protection for this type of work is provided under the copyright law.

Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are more complex to analyze and are addressed below. If the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Schrader, 22 F.3d at 294-95, 30 USPQ2d at 1458-59. Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

In practical terms, claims define nonstatutory processes if they: - consist solely of mathematical operations without some claimed practical application (i.e., executing a

"mathematical algorithm"); or simply manipulate abstract ideas, e.g., a bid (Schrader, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759), without some claimed practical application.

Certain mathematical algorithms have been held to be nonstatutory because they represent a mathematical definition of a law of nature or a natural phenomenon. For example, a mathematical algorithm representing the formula $E = mc^2$ is a "law of nature" in it defines a "fundamental scientific truth" (i.e., the relationship between energy and mass). To comprehend how the law of nature relates to any object, one invariably has to perform certain steps (e.g., multiplying a number representing the mass of an object by the square of a number representing the speed of light). In such a case, a claimed process which consists solely of the steps that one must follow to solve the mathematical representation of $E = mc^2$ is indistinguishable from the law of nature and would "preempt" the law of nature. A patent cannot be granted on such a process.

(a) Functional Descriptive Material: "Data Structures" Representing Descriptive Material Per Se or Computer Programs Representing Computer Listings Per Se Data structures not claimed as embodied in computer-readable media are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer. See, e.g., Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a data structure defines

structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory. Similarly, computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer, which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. Accordingly, it is important to distinguish claims that define descriptive material per se from claims that define statutory inventions.

44. In response to Applicant's arguments (page 32) **against the references individually**, one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Zhang discloses a multimedia streaming server (210, fig 2) which streams multimedia data corresponding to a predetermined quality of service (QoS) level (214, fig2, page 3, paragraph #0044) in response to a parsing result of metadata (meta data is interpreted as information about information, i.e. MSFTP-

TCP friendly header, para #0049) corresponding to multimedia data intended to be provided for service (216, fig 2, para #0044, **“A Quality of Service (QoS) Adaptation and Global Resource Allocation Control module 214 adjusts the quality of the bit stream that is transmitted from server 210 to client 230 through Internet 220. Module 214 periodically estimates the available bandwidth from the MSTFP protocol as derived from module 212. Combining this information with the media characteristics of media streams Video.sub.m, Video.sub.n, and Audio.sub.k, module 214 adjusts the quality of the total transmitted streams by resource re-allocation in a Global Buffer Control module 216 at Server 210. Data occupying the global buffer is transmitted from Server 210 in the MSFTP protocol at module 212 through Internet”**). Lennon discloses wherein the metadata has multimedia data and streaming-related information (page 4, paragraph #0060). It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by Zhang to incorporate the metadata and XML teachings of Lennon for efficiently using bandwidth.

45. In response to Applicant's arguments (pages 33-34) **against the references individually**, one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Zhang discloses a bandwidth measuring unit which

measures a network bandwidth by using the time interval when the multimedia data is received in the packet receiving unit and the size information of the data (230, fig 2 and fig 9, pages 3-4, paragraph #0044-#0061). Lennon discloses a message transmission unit which transmits the measured network bandwidth to the server so that the transmission rate of the multimedia data transmitted from the server is adjusted to the network bandwidth (modifications of bandwidth #0216-217). It would have been obvious to one having ordinary skill in the art at the time invention was made to implement an end-end framework for media streaming over the Internet taught by ZHANG to incorporate the media browser server of Lennon for customizing the streaming of the content to the device by modifying bandwidth.

46. In the remarks applicants argued that:

Argument: Zhang does not disclose a quality of service (QoS) processing unit which selects a QoS level available for service in response to the descriptor information and the network bandwidth information, and extracts multimedia data corresponding to the selected QoS level, from the data storage unit.

Response: Zhang discloses a quality of service (QoS) processing unit which selects a QoS level available for service in response to the descriptor information and the network bandwidth information (214, fig 2, page 3, paragraph #0044), and extracts multimedia data corresponding to the selected QoS level (214, fig 2, page 3, paragraph #0044), from the data storage unit (216, 214 fig 2, page 3, paragraph #0044);

Argument: Zhang does not disclose the QoS processing unit comprises: a service level selection unit which compares a target bit rate for each QoS level with the bandwidth and selects a predetermined QoS level; and a frame selection unit which extracts frames corresponding to the QoS level from the multimedia data stored in the data storage unit and stores the extracted frames in the buffer.

Response: Zhang discloses the QoS processing unit comprises: a service level selection unit which compares a target bit rate for each QoS level (adjust the quality, 214, fig 2, para #0044) with the bandwidth and selects a predetermined QoS level (214, fig 2, pages 3-4, paragraph #0044-#0061); and a frame selection unit which extracts frames corresponding to the QoS level (214, fig 2) from the multimedia data stored in the data storage unit (210, fig 2) and stores the extracted frames (fig 7, para #0084) in the buffer (pages 3-4, paragraph #0044-#0061).

Applicant's arguments on pages 34-39, amount to a general allegation that the claims define a patentable invention. Applicant's arguments **against the references individually**, one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. Applicants failed to specifically pointing out how the language of the claims patentably distinguishes them from the references. Further Zhang discloses Zhang setting the size value of an accumulated packet to 0 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); (d) after the first packet is input till a last packet is input, whenever a packet is input, accumulating the size value of the packet to the size of the

accumulated packet (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control); measuring the network bandwidth by calculating: Accumulated packet size .times. 1000 .times. 8 TS2 - TS1 (fig 9, pages 7-9, please see the discussion of Network Adaptive Rate Control).

Conclusion

47. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MOHAMMAD A. SIDDIQI whose telephone number is (571)272-3976. The examiner can normally be reached on Monday -Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MS

/Nathan J. Flynn/
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